NEW MEXICO
ENVIRONMENT DEPARTMENT

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RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

Certified Mail - Return Receipt Requested

May 29, 2014

Mr. Jordan (Lloyd) Martinez, Supervisor
Water/Wastewater Department
Post Office Box K
302 Main Street
Socorro, New Mexico 87801

Re: Socorro Wastewater Treatment Plant; Major; Individual Permit; SIC 4952; Compliance Evaluation Inspection; NPDES Permit NM0028835; May 15, 2014

Dear Mr. Martinez:

Enclosed please find a copy of the report and check list for the referenced inspection that the New Mexico Environment Department (NMED) conducted at your facility on behalf of the U.S. Environmental Protection Agency (USEPA). This inspection report will be sent to the USEPA in Dallas for their review. These inspections are used by USEPA to determine compliance with the National Pollutant Discharge Elimination System (NPDES) permitting program in accordance with requirements of the federal Clean Water Act.

You are encouraged to review the inspection report, required to correct any problems noted during the inspection, and advised to modify your operational and/or administrative procedures, as appropriate. If you have comments on or concerns with the basis for the findings in the NMED inspection report, please contact us (see the address below) in writing within 30 days from the date of this letter. Further you are encouraged to notify in writing both USEPA and NMED regarding modifications and compliance schedules at the addresses below:

Racquel Douglas
US Environmental Protection Agency, Region VI
Enforcement Branch (6EN-WM)
Fountain Place
1445 Ross Avenue
Dallas, Texas 75202-2733

Bruce Yurdin
New Mexico Environment Department
Surface Water Quality Bureau
Point Source Regulation Section
P.O. Box 5469
Santa Fe, New Mexico 87502

If you have any questions about this inspection report, please contact Sandra Gabaldon at (505) 827-1041 or at sandra.gabaldon@state.nm.us.

Sincerely,

/s/ Bruce J. Yurdin

Bruce J. Yurdin
Program Manager
Point Source Regulation Section
Surface Water Quality Bureau

cc: Carol Peters-Wagnon, USEPA (6EN-WM) by e-mail
Racquel Douglas, USEPA (6EN-WM) by e-mail
Gladys Gooden-Jackson USEPA (6EN-WC) by e-mail
Brent Larsen, USEPA (6WP-PP) by e-mail
NMED District I, by e-mail

EPA

Form Approved
OMB No. 2040-0003
Approval Expires 7-31-85

NPDES Compliance Inspection Report

Section A: National Data System Coding

1	2	3	NPDES	11	12	yr/mo/day	17	18	Inspec. Type	19	Inspector	20	Fac Type
	N	5	NM0028835			140515			C		S		1

M	A	J	O	R		W	W	T	P																	

Inspection Work Days		Facility Evaluation Rating		BI		QA		Reserved	
67	69	70	2	71	N	72	N	73 74	75 80	

Section B: Facility Data

Name and Location of Facility Inspected *(For industrial users discharging to POTW, also include POTW name and NPDES permit number)*
Take I-25 South, exit 150. At Manzanares Street Turn left. Then take another left onto Main Street. WWTP is on the right side.

SOCORRO COUNTY

Entry Time /Date: 1120 Hours / May 15, 2014

Permit Effective Date: November 1, 2010

Exit Time/Date: 1440 Hours / May 15, 2014

Permit Expiration Date: October 31, 2015

Name(s) of On-Site Representative(s)/Title(s)/Phone and Fax Number(s)
Pauline Taylor, Supervisor / (505) 835-0240
Lloyd Martinez, Utility Director / (505) 650-0545 (c) / (575) 838-1607 (Fax)

Other Facility Data

SIC 4952

Name, Address of Responsible Official/Title/Phone and Fax Number
Jordan Lloyd Martinez, Utility Director / (575) 650-0545 / (575) 838-1607
PO Box K
302 Main Street
Socorro, NM 87801

Contacted: Yes [*] No [ ]

OUTFALL 001:

34.0533700
-106.88833

Section C: Areas Evaluated During Inspection

(S = Satisfactory, M = Marginal, U = Unsatisfactory, N = Not Evaluated)

S	Permit	M	Flow Measurement	M	Operations & Maintenance	N	CSO/SSO
U	Records/Reports	M	Self-Monitoring Program	S	Sludge Handling/Disposal	N	Pollution Prevention
S	Facility Site Review	N	Compliance Schedules	N	Pretreatment	N	Multimedia
S	Effluent/Receiving Waters	S	Laboratory	N	Storm Water	N	Other:

Section D: Summary of Findings/Comments (Attach additional sheets if necessary)

Please see checklist and further explanations for details of findings

Name(s) and Signature(s) of Inspector(s)	Agency/Office/Telephone/Fax	Date
Sandra Gabaldon */s/ Sandra Gabaldon*	NMED/SWQB/(505) 827-1041/(505) 827-0610	5-29-2014
Signature of Management QA Reviewer ***/s/ Michelle Lemon*** **Michelle Lemon, Municipal Team Lead**	**Agency/Office/Phone and Fax Numbers** **NMED/SWQB/(505) 827-2819/(505) 827-0610**	**Date** **5-29-2014**

SOCORRO WASTEWATER TREATMENT PLANT	PERMIT NO.: NM0028835

SECTION A - PERMIT VERIFICATION

PERMIT SATISFACTORILY ADDRESSES OBSERVATIONS X S ¨ M ¨ U ¨ NA (*FURTHER EXPLANATION ATTACHED NO*)

DETAILS:

1. CORRECT NAME AND MAILING ADDRESS OF PERMITTEE	X Y ¨ N ¨ NA
2. NOTIFICATION GIVEN TO EPA/STATE OF NEW DIFFERENT OR INCREASED DISCHARGES	O Y ¨ N X NA
3. NUMBER AND LOCATION OF DISCHARGE POINTS AS DESCRIBED IN PERMIT	X Y ¨ N ¨ NA
4. ALL DISCHARGES ARE PERMITTED	X Y ¨ N ¨ NA

SECTION B - RECORDKEEPING AND REPORTING EVALUATION

RECORDS AND REPORTS MAINTAINED AS REQUIRED BY PERMIT. O S ¨ M X U ¨ NA (*FURTHER EXPLANATION ATTACHED YES*)
DETAILS:

1. ANALYTICAL RESULTS CONSISTENT WITH DATA REPORTED ON DMRs.	¨ Y X N ¨ NA
2. SAMPLING AND ANALYSES DATA ADEQUATE AND INCLUDE.	X S ¨ M ¨ U ¨ NA
a) DATES, TIME(S) AND LOCATION(S) OF SAMPLING	O Y X N ¨ NA
b) NAME OF INDIVIDUAL PERFORMING SAMPLING	X Y ¨ N ¨ NA
c) ANALYTICAL METHODS AND TECHNIQUES.	X Y ¨ N ¨ NA
d) RESULTS OF ANALYSES AND CALIBRATIONS.	X Y ¨ N ¨ NA
e) DATES AND TIMES OF ANALYSES.	X Y ¨ N ¨ NA
f) NAME OF PERSON(S) PERFORMING ANALYSES.	X Y ¨ N ¨ NA
3. LABORATORY EQUIPMENT CALIBRATION AND MAINTENANCE RECORDS ADEQUATE.	X S ¨ M ¨ U ¨ NA
4. PLANT RECORDS INCLUDE SCHEDULES, DATES OF EQUIPMENT MAINTENANCE AND REPAIR.	X S ¨ M ¨ U ¨ NA
5. EFFLUENT LOADINGS CALCULATED USING DAILY EFFLUENT FLOW AND DAILY ANALYTICAL DATA.	O Y X N ¨ NA

SECTION C - OPERATIONS AND MAINTENANCE

TREATMENT FACILITY PROPERLY OPERATED AND MAINTAINED. ¨ S X M ¨ U ¨ NA *(FURTHER EXPLANATION ATTACHED NO)*
DETAILS:

1. TREATMENT UNITS PROPERLY OPERATED.	X S ¨ M O U ¨ NA
2. TREATMENT UNITS PROPERLY MAINTAINED.	X S ¨ M OU ¨ NA
3. STANDBY POWER OR OTHER EQUIVALENT PROVIDED. Generator does not power the facility completely. Only chlorination and influent pumps.	O S X M O U ¨ NA
4. ADEQUATE ALARM SYSTEM FOR POWER OR EQUIPMENT FAILURES AVAILABLE. 18 lift stations with an audible/sight alarm. There is no alarm system in which notification of staff is immediate notifying that an overflow has occurred at the lift station. Staff members state that they visit the lift stations often; it may be that one lift station may overflow when there is no one available to hear or see the alarm. The permittee stated that they are on two separate grids to eliminate power failures.	O S X M O U ¨ NA
5. ALL NEEDED TREATMENT UNITS IN SERVICE	X S ¨ M O U ¨ NA
6. ADEQUATE NUMBER OF QUALIFIED OPERATORS PROVIDED.	X S ¨ M OU ¨ NA
7. SPARE PARTS AND SUPPLIES INVENTORY MAINTAINED.	X S ¨ M ¨ U ¨ NA
8. OPERATION AND MAINTENANCE MANUAL AVAILABLE.	X Y ¨ N ¨ NA
STANDARD OPERATING PROCEDURES AND SCHEDULES ESTABLISHED.	X Y O N ¨ NA
PROCEDURES FOR EMERGENCY TREATMENT CONTROL ESTABLISHED.	X Y ¨ N ¨ NA

SOCORRO WASTEWATER TREATMENT PLANT	PERMIT NO.: NM0028835

SECTION C - OPERATIONS AND MAINTENANCE (CONT'D)

9. HAVE BYPASSES/OVERFLOWS OCCURRED AT THE PLANT OR IN THE COLLECTION SYSTEM IN THE LAST YEAR?	O Y X N ¨ NA
IF SO, HAS THE REGULATORY AGENCY BEEN NOTIFIED?	O Y ¨ N X NA
HAS CORRECTIVE ACTION BEEN TAKEN TO PREVENT ADDITIONAL BYPASSES/OVERFLOWS?	O Y ¨ N X NA
10.HAVE ANY HYDRAULIC OVERLOADS OCCURRED AT THE TREATMENT PLANT?	¨ Y X N ¨ NA
IF SO, DID PERMIT VIOLATIONS OCCUR AS A RESULT?	¨ Y ¨ N X NA

SECTION D - SELF-MONITORING

PERMITTEE SELF-MONITORING MEETS PERMIT REQUIREMENTS. ¨ S X M ¨ U ¨ NA *(FURTHER EXPLANATION ATTACHED YES).*
DETAILS:

1. SAMPLES TAKEN AT SITE(S) SPECIFIED IN PERMIT.	X Y ¨ N ¨ NA
2. LOCATIONS ADEQUATE FOR REPRESENTATIVE SAMPLES.	X Y ¨ N ¨ NA
3. FLOW PROPORTIONED SAMPLES OBTAINED WHEN REQUIRED BY PERMIT.	X Y ¨ N ¨ NA
4. SAMPLING AND ANALYSES COMPLETED ON PARAMETERS SPECIFIED IN PERMIT.	X Y ¨ N ¨ NA
5. SAMPLING AND ANALYSES PERFORMED AT FREQUENCY SPECIFIED IN PERMIT.	X Y ¨ N ¨ NA
6. SAMPLE COLLECTION PROCEDURES ADEQUATE	X Y ¨ N ¨ NA
a) SAMPLES REFRIGERATED DURING COMPOSITING.	X Y ¨ N ¨ NA
b) PROPER PRESERVATION TECHNIQUES USED.	X Y ¨ N ¨ NA
c) CONTAINERS AND SAMPLE HOLDING TIMES CONFORM TO 40 CFR 136.3.	X Y ¨ N ¨ NA
7. IF MONITORING AND ANALYSES ARE PERFORMED MORE OFTEN THAN REQUIRED BY PERMIT, ARE THE RESULTS REPORTED IN PERMITTEE'S SELF-MONITORING REPORT?	¨ Y X N ¨ NA

SECTION E - FLOW MEASUREMENT

PERMITTEE FLOW MEASUREMENT MEETS PERMIT REQUIREMENTS. ¨ S X M ¨ U ¨ NA *(FURTHER EXPLANATION ATTACHED YES)*
DETAILS:

1. PRIMARY FLOW MEASUREMENT DEVICE PROPERLY INSTALLED AND MAINTAINED. TYPE OF DEVICE	X Y ¨ N ¨ NA
2. FLOW MEASURED AT EACH OUTFALL AS REQUIRED.	X Y ¨ N ¨ NA
3. SECONDARY INSTRUMENTS (TOTALIZERS, RECORDERS, ETC.) PROPERLY OPERATED AND MAINTAINED.	X Y ¨ N ¨ NA
4. CALIBRATION FREQUENCY ADEQUATE.	X Y ¨ N ¨ NA
RECORDS MAINTAINED OF CALIBRATION PROCEDURES.	O Y X N ¨ NA
CALIBRATION CHECKS DONE TO ASSURE CONTINUED COMPLIANCE.	O Y X N ¨ NA
5. FLOW ENTERING DEVICE WELL DISTRIBUTED ACROSS THE CHANNEL AND FREE OF TURBULENCE.	X Y ¨ N ¨ NA
6. HEAD MEASURED AT PROPER LOCATION.	X Y ¨ N ¨ NA
7. FLOW MEASUREMENT EQUIPMENT ADEQUATE TO HANDLE EXPECTED RANGE OF FLOW RATES.	X Y ¨ N ¨ NA

SECTION F – LABORATORY

PERMITTEE LABORATORY PROCEDURES MEET PERMIT REQUIREMENTS. X S ¨ M ¨ U ¨ NA *(FURTHER EXPLANATION ATTACHED YES)*
DETAILS:

1. EPA APPROVED ANALYTICAL PROCEDURES USED *(40 CFR 136.3 FOR LIQUIDS, 503.8(b) FOR SLUDGES)*	O Y X N ¨ NA

SOCORRO WASTEWATER TREATMENT PLANT	PERMIT NO.: NM0028835

SECTION F - LABORATORY (CONT'D)

2. IF ALTERNATIVE ANALYTICAL PROCEDURES ARE USED, PROPER APPROVAL HAS BEEN OBTAINED ¨ Y ¨ N X NA

3. SATISFACTORY CALIBRATION AND MAINTENANCE OF INSTRUMENTS AND EQUIPMENT. X S O M ¨ U ¨ NA

4. QUALITY CONTROL PROCEDURES ADEQUATE. X S ¨ M ¨ U ¨ NA

5. DUPLICATE SAMPLES ARE ANALYZED. 100 % OF THE TIME. X Y ¨ N ¨ NA

6. SPIKED SAMPLES ARE ANALYZED. 100 % OF THE TIME. X Y ¨ N O NA

7. COMMERCIAL LABORATORY USED. X Y ¨ N ¨ NA

LAB NAME Hall Environmental Analysis Laboratory Bio-Aquatics

LAB ADDRESS 401 Hawkins, NE; Albuquerque, NM 87109 2501 Mayes Rd, Carrollton, TX 75006

PARAMETERS PERFORMED Dissolved and Total Aluminum Biomonitoring

SECTION G - EFFLUENT/RECEIVING WATERS OBSERVATIONS. X S ¨ M O U ¨ NA *(FURTHER EXPLANATION ATTACHED NO).*

OUTFALL NO.	OIL SHEEN	GREASE	TURBIDITY	VISIBLE FOAM	FLOAT SOL.	COLOR	OTHER
001	None	None	None	None	None	None	

RECEIVING WATER OBSERVATIONS: No notable observations made of the effluent / receiving waters. Discharge is into an irrigation ditch (Luis Lopez Drain) which is currently being used for agricultural purposes.

SECTION H - SLUDGE DISPOSAL

SLUDGE DISPOSAL MEETS PERMIT REQUIREMENTS. X S ¨ M ¨ U ¨ NA *(FURTHER EXPLANATION ATTACHED NO).*
DETAILS:

1. SLUDGE MANAGEMENT ADEQUATE TO MAINTAIN EFFLUENT QUALITY. X S ¨ M ¨ U ¨ NA

2. SLUDGE RECORDS MAINTAINED AS REQUIRED BY 40 CFR 503. X S ¨ M ¨ U ¨ NA

3. FOR LAND APPLIED SLUDGE, TYPE OF LAND APPLIED TO: N/A (e.g., FOREST, AGRICULTURAL, PUBLIC CONTACT SITE)

SECTION I - SAMPLING INSPECTION PROCEDURES *(FURTHER EXPLANATION ATTACHED ___).*

1. SAMPLES OBTAINED THIS INSPECTION. ¨ Y ¨ N X NA

2. TYPE OF SAMPLE OBTAINED

GRAB _____ COMPOSITE SAMPLE ___ METHOD _____ FREQUENCY

3. SAMPLES PRESERVED. ¨ Y ¨ N ¨ NA

4. FLOW PROPORTIONED SAMPLES OBTAINED. ¨ Y ¨ N ¨ NA

5. SAMPLE OBTAINED FROM FACILITY'S SAMPLING DEVICE. ¨ Y ¨ N ¨ NA

6. SAMPLE REPRESENTATIVE OF VOLUME AND MATURE OF DISCHARGE. ¨ Y ¨ N ¨ NA

7. SAMPLE SPLIT WITH PERMITTEE. ¨ Y ¨ N ¨ NA

8. CHAIN-OF-CUSTODY PROCEDURES EMPLOYED. ¨ Y ¨ N ¨ NA

9. SAMPLES COLLECTED IN ACCORDANCE WITH PERMIT. ¨ Y ¨ N ¨ NA

Compliance Evaluation Inspection
Socorro Wastewater Treatment Plant
NPDES Permit No. NM0028835
Inspection Date: May 15, 2014

Introduction

A Compliance Evaluation Inspection (CEI) was conducted at the Socorro Wastewater Treatment Plant (WWTP), located in Socorro, New Mexico on May 15, 2014 by Ms. Sandra Gabaldón, of the State of New Mexico Environment Department (NMED), Surface Water Quality Bureau (SWQB). This facility is classified as a major discharger under the federal Clean Water Act (CWA), Section 402. This facility is regulated under the National Pollutant Discharge Elimination System (NPDES) permit program, and is assigned NPDES permit number NM0028835. The facility design flow is 1.3 million gallons per day (MGD).

The Socorro Wastewater Treatment Plant discharges to a receiving water named Luis Lopez Drain, thence to Socorro Riverside Drain, thence to the Rio Grande in Segment 20.6.4.105 of the Rio Grande Basin. Designated uses of this segment include: Irrigation, marginal warmwater aquatic life, livestock watering, public water supply, wildlife habitat and primary contact. There is a Total Maximum Daily Load (TMDL) on this segment of the Rio Grande for E. coli and dissolved aluminum.

Ms. Gabaldón arrived at the WWTP at approximately 1122 hours conducted an entrance interview with Ms. Pauline Taylor, Superintendent. The inspector made introductions, presented her credentials, and discussed the purpose of the inspection with Ms. Taylor. An exit interview to discuss preliminary findings of the inspection was conducted with Ms. Pauline Taylor, Superintendent, Mr. Lloyd Martinez, Wastewater Director, and Mr. Cody Polston, Laboratory Technician on site.

The NMED performs a specific number of CEI's annually for the United States Environmental Protection Agency (USEPA). The purpose of this inspection is to provide the USEPA with information to evaluate the permittee's compliance with their NPDES permit. The enclosed inspection report is based on verbal information supplied by the permittee's representatives, observations made by the NMED inspector, and a review of records maintained by the permittee, commercial laboratories, and/or NMED. Findings of the inspection are detailed on the attached EPA form 3560-3 and in the narrative Further Explanations section of the report.

Treatment Scheme

The City of Socorro WWTP is an intermittent cycle extended aeration system (ICEAS). This sequencing batch reactor system works in steps to biologically degrade the influent. The reaction basin operates sequentially as an aeration basin, sedimentation basin and decantation basin. There are three basins available at this facility for treatment.

Influent flows into the pre-react zone. This compartment is located at the entrance of the basin and is separated with a baffle from the main treatment tank. The influent undergoes partial treatment in the pre-react zone prior to entering the main treatment chamber through opening at the base of the baffle

wall. The pre-react zone is aerated and serves as both a biological adsorption and microorganism selector zone.

Treatment occurs during a three step cycle. Each step of the cycle is controlled automatically by the programmable logic controller (PLC). The first step is an aeration period. Coarse bubble diffusers are used for aeration in the basin. The second step is settling. Solids settle and leave a clear supernatant on top. Thirdly, the supernatant is decanted and discharges.

Sludge:

Sludge is taken to the City of Socorro Landfill.

Compliance Evaluation Inspection
City of Socorro Wastewater Treatment Plant
NPDES Permit No. NM0028835
Inspection Date: May 15, 2014

Further Explanations

Note: The sections are arranged according to the format of the enclosed EPA inspection checklist (Form 3560-3), rather than being ranked in order of importance.

Section B - Recordkeeping and Reporting Evaluation – Overall Rating of "Marginal"

Permit Requirements for Recordkeeping and Reporting Evaluation

The permit requires, in Part III, Section C.4, Monitoring and Records:

Records of monitoring information shall include:

*a. The date, **exact place**, and time of sampling or measurement;*
b. The individual(s) who performed the sampling or measurements;
c. The date(s) and time(s) analyses were performed;
d. The individual(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of such analyses.

Findings for Recordkeeping and Reporting Evaluation

The permittee does an excellent job of maintaining records and reporting through EPA's eDMR. However, the bench sheets for E. coli, provided by the permittee, do not have the exact location of the effluent sampling point. It should state the exact location and not just "effluent flow".

On the TSS bench sheet it states that the sample collection location is the bottom of the final cascade which is an incorrect location. The ISCO sampler is set up at the end of the Chlorine contact chamber. This needs to be corrected on the bench sheet.

BOD bench sheets state "final effluent". This needs to be the exact location of sampling.

The permittee is required to analyze dissolved and total aluminum once per month. Hall Environmental Analysis Laboratory is contracted by the City of Socorro to analyze both dissolved and total aluminum. The permittee submitted the concentration for dissolved aluminum as 0.012 mg/L for the month of June 2013. The bench sheet for Hall Environmental provided to the permittee has a result for dissolved aluminum as Non-Detect. The values below the detection limit are to be reported with a less than symbol (<) and the numeric value for the detection limit. In this case, the detection

limit is 0.020 mg/L. The permittee should have submitted the results as < 0.020 mg/L for dissolved aluminum. It is unclear where the permittee got the results of 0.012 mg/L that were submitted on their DMR for June 2013.

It appears the permittee is not using the flow on the day of sampling for their 7-day average loading and the 30-day average loading calculations. Rather, the permittee may be using the average flow for the week for their calculations. For the month of June 2013 the following information was provided:

BOD

Sample Date:	Daily Flow (MGD)	BOD (mg/l)	Calculated Daily Load
FORMULA: Flow on day of sampling (MGD) x concentration (mg/L) x 8.34 (lbs/gal)			
06/05/2013	0.73	4.01	(0.73) x (4.01) x 8.34 = 24.41
06/12/2013	0.77	1.89	(0.77) x (1.89) x 8.34 = 12.14
06/19/2013	0.81	5.69	(0.81) x (5.69) x 8.34 = 38.44
06/26/2013	0.73	3.64	(0.73) x (3.64) x 8.34 = 22.16
Calculated Monthly Average (Loading):	24.41 + 12.14 + 38.44 + 22.16 / 4 = **24.29***		
Calculated 7-day Average (Loading):	(0.81) x (5.69) x 8.34 = **38.44***		
Reported on DMR	**7-D average loading = 36.5 lbs/day** **30-D average loading = 23.5 lbs/day**		

*These values do not reflect what was reported on the DMR.

TSS

Sample Date:	Daily Flow (MGD)	TSS (mg/l)	Calculated Daily Load
FORMULA: Flow on day of sampling (MGD) x concentration (mg/L) x 8.34 (lbs/gal)			
06/05/2013	0.73	5.06	(0.73) x (5.06) x 8.34 = 30.81
06/12/2013	0.77	3.93	(0.77) x (3.93) x 8.34 = 25.24
06/19/2013	0.81	5.73	(0.81) x (5.73) x 8.34 = 38.71
06/26/2013	0.73	3.30	(0.73) x (3.30) x 8.34 = 20.09
Calculated Monthly Average (Loading):	30.81 + 25.24 + 38.71 + 20.09 = **28.71 lbs/d****		
Calculated 7-day Average (Loading):	(0.81) x (5.73) x 8.34 = **38.71****		
Reported on DMR	**7-D average loading = 36.8 lbs/d**		

	30-D average loading = 27.8 lbs/d

**These values do not reflect what was reported on the DMR.

Section D – Self-Monitoring – Overall Rating of "Marginal"

Permit Requirements for Self- Monitoring

The permit requires, in Part III, Section D.5, Additional Monitoring by the Permittee:

> *If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR. Such increased monitoring frequency shall also be indicated on the DMR.*

Findings for Self-Monitoring:

The permittee does duplicate sampling once a month. The permittee is not reporting these results on the DMR as required by Part III, Section D.5, Additional Monitoring by the Permittee.

Section E – Flow Measurement – Overall Rating of "Marginal"

Permit Requirements for Flow Measurement:
The permit requires in Part III.C.6 Flow Measurement:

> *Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated, and maintained to insure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than 10% from true discharge rates throughout the range of expected discharge volumes.*

Findings for Flow Measurement:

The permittee is not doing calibration checks for their primary and secondary flow devices to insure flows are consistent with a maximum deviation of less than 10% from the true discharge rates that are reported.

Section F – Laboratory – Overall Rating of "Satisfactory"

Permit Requirements for Laboratory:

The permit requires in Part III.C.5: Monitoring Procedures:

a. Monitoring must be conducted according to test procedures approved under 40 CFR Part 136 unless other test procedures have been specified in this permit or approved by the Regional Administrator.

Findings for Laboratory:

40 CFR 136, Identification of Test Procedures:

TABLE IA—LIST OF APPROVED BIOLOGICAL METHODS FOR WASTEWATER AND SEWAGE SLUDGE

Parameter and units	Method [1]	EPA	Standard methods	AOAC, ASTM,USGS	Other
Bacteria:					
E. coli, number per 100 mL [21]	MPN [6,8,16] multiple tube, or		9221B.1-2006/9221F-2006 *12,14*		
	multiple tube/multiple well, or		9223 B-2004[13]	991.15 [10]	Colilert®*13,18* Colilert-18®*13,17,18*
	MF *2,6,7,8* single step	1603			mColiBlue-24®*19*
Enterococci, number per 100 mL [22]	MPN *6,8,* multiple tube/multiple well, or			D6503-99 [9]	Enterolert®*13,24*
	MF *2,6,7,8* single step or	1600 [25]	9230 C-2007		
	Plate count	p. 143 [3].			

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES

Parameter	Methodology [58]	EPA [52]	Standard methods	ASTM	USGS/AOAC/Other
Aluminum—Total,[4] mg/L	Digestion,[4] followed by any of the following:				
	AA direct aspiration [36]		3111 D-1999 or 3111 E-1999		I-3051-85.[2]
	AA furnace		3113 B-2004		
	STGFAA	200.9, Rev. 2.2 (1994)			
	ICP/AES [36]	200.5, Rev 4.2 (2003) [68]; 200.7, Rev. 4.4 (1994)	3120 B-1999	D1976-07	I-4471-97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B-2009	D5673-05	993.14,[3] I-4471-97.[50]
	Direct Current Plasma (DCP) [36]			D4190-08	See footnote.[34]
	Colorimetric (Eriochrome cyanine R)		3500-Al B-2001		
Biochemical oxygen demand	Dissolved Oxygen Depletion		5210 B-2001		973.44[3], p. 17.[9], I-1578-78,[8] See footnote.[10,63]

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES					
Parameter	Methodology [58]	EPA [52]	Standard methods	ASTM	USGS/AOAC/Other
(BOD5), mg/L					
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B-2009	D5673-05	993.14,[3] I-4471-97.[50]
	DCP[36]			D4190-08	See footnote.[34]
Chlorine-Total residual, mg/L	Amperometric direct		4500-Cl D-2000	D1253-08	
	Amperometric direct (low level)		4500-Cl E-2000		
	Iodometric direct		4500-Cl B-2000		
	Back titration ether end-point[15]		4500-Cl C-2000		
	DPD-FAS		4500-Cl F-2000		
	Spectrophotometric, DPD		4500-Cl G-2000		
Hydrogen ion (pH), pH units	Electrometric measurement		4500-H B-2000	D1293-99 (A or B)	973.41,[3] I-1586-85.[2]
	Automated electrode	150.2 (Dec. 1982)[1]			See footnote,[21] I-2587-85.[2]

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES					
Parameter	Methodology [58]	EPA [52]	Standard methods	ASTM	USGS/AOAC/Other
Oxygen, dissolved, mg/L	Winkler (Azide modification)		4500-O B-2001, C-2001, D-2001, E-2001, F-2001	D888-09 (A)	973.45B[3], I-1575-78.[8]
	Electrode		4500-O G-2001	D888-09 (B)	I-1576-78.[8]
	Luminescence Based Sensor			D888-09 (C)	See footnote[63] See footnote.[64]
Residue—non-filterable (TSS), mg/L	Gravimetric, 103-105° post washing of residue		2540 D-1997	D5907-03	I-3765-85.[2]

Findings for Laboratory:

The dates of approval, which are listed beneath the method, are important. These indicate the Standard Methods for the Examination of Water and Wastewater Edition that are approved under 40 CFR 136.

The permittee should verify that the Standard Methods Edition they are using is the approved method in 40 CFR 136. For example, for pH (Hydrogen Ion) the Standard Methods Edition that is approved is Standard Methods 21st Edition, according to the approval date of 2000.

The permittee states they use Standard Methods 18th Edition for their analysis of permit effluent limits. The permittee should be using the Standard Methods with the approved dates listed above.

SC

CITY OF SOCORRO

RAVI BHASKER
MAYOR

111 SCHOOL OF MINES ROAD
P.O. DRAWER K
SOCORRO, NEW MEXICO 87801
PHONE: (575) 835-0240
FAX: (575) 838-4027

GEORGE PATRICK SALOME, JR.
CITY CLERK

June 25, 2014

Racquel Douglas
US Environmental Protection Agency, Region VI
Enforcement Branch (6EN-WM)
Fountain Place
1445 Ross Avenue
Dallas, Texas 75202-2733

Re: **Socorro Wastewater Treatment Plant; Major; Individual Permit; SIC 4952; Compliance Evaluation Inspection; NPDES Permit NM0028835; May 15, 2014**

Dear Mrs. Douglas:

Enclosed you will find our response to your letter dated May 29, 2014 in regards to the above listed evaluation inspection.

Standby power or other equivalent provided: The City of Socorro will be meeting with the City's Engineer, Dennis Engineering to see what changes need to be made to power the facility completely and look for available funding.

Adequate alarm system for power and equipment failures available: We have in recent months, along with our engineers been looking into a SCADA system in which we would be able to monitor all lift stations, flows and levels amongst other systems within the City. We are also looking into a more cost effective way of accomplishing the same goal with a remote signal sent to a cell phone in the case of a high level or power loss.

Finding for Recordkeeping and Reporting Evaluation: All data sheets have been rewritten to include monitoring information including exact locations of sampling points and will also include the name of the individual who performs the analyses.

The permittee is required to analyze dissolved and total aluminum once per month: When the City receives a non-detect or lower than the reporting detection limit, the City will now use the "less than" symbol (<).

It is unclear where the permittee got the results of 0.012 mg/L that were submitted on the DMR for June 2013: In questioning the lab tech, he typed in the wrong results and was advised to be more diligent in his reporting.

It appears the permittee is not using the flow on the day of sampling for their 7-day average loading and the 30-day average loading calculations: The lab tech has been instructed to change the way he calculates both the 7-day average loading and 30-day average loading. The data reporting sheet has also been modified.

The permit requires, in Part III, Section D.5, Additional Monitoring by the Permittee: The permittee will report these results on the DMR as required by Part III, Section D.5 in the comments section on Net DMR.

The permittee does duplicate sampling once a month. The permittee is not reporting these results on the DMR as required by Part III, Section D.5, Additional Monitoring by the Permittee: The permittee will report duplicates in the calculations and add a note in the comment section of the Net DMR.

The permittee is not doing calibration checks for their primary and secondary flow devices to insure flows are consistent with the maximum deviation of less than 10% form the true discharge rates that are reporting: The permittee obtained a flow measuring chart from Yukon to check calibration once a month.

The permittee should verify that the Standard Methods Edition they are using is the approved method in 40 CFR 136: All permit monitoring procedures have been updated for the methods and calculations on the bench sheets.

Treatment Scheme: In reading the treatment scheme, I found an error in the description of the bubbler diffusers. The City of Socorro has a fine bubble diffuser system not coarse bubble diffusers.

We at the City of Socorro Wastewater Treatment Plant hope that we have addressed all deficiencies noted with corrective action. Enclosed are all the revised bench sheets for your review.

If you have any questions please call us at 575-838-1606.

Thank you,

Lloyd Martinez
City of Socorro
Utility Director

cc: Bruce Yurdin, New Mexico Environment Department, via mail
Mayor Ravi Bhasker, City of Socorro, via hand delivery

City of Socorro, WWTP

Lab Monthly Maintenance/ Calibrations

Balance Calibration

50g	1g	100mg	50mg	2mg	Auto Cal.	Initials

Autoclave Calibrations

PSI	Temp Gauge	Time Remaining	Thermometer Reading	Spore Strip	Lab Tech

HACH DR/850 Colorimeter Calibration

Expected Value	First Reading	Second Reading	Average	Lab Tech

Drierite Log

Date	Changed Y or N	Lab Tech

Reagents Preparation

	Date	Initials
Sulfuric Acid Con		
KI Solution		
Sodium Hydroxide		

Vacuum Pump

Filters Cleaned	Oil Level	Lab Tech

Flow Meter Calibrations

Influent Flow Meter

Weir Reading	Meter Reading	MGD	Initials
Date Completed			

Effluent Flow Meter

Weir Reading	Meter Reading	MGD	Initials
Date Completed			

Pipets Washed

Date	Initials

Glassware Cleaned

Date	Initials

City of Socorro WWTP
Daily Lab Bench Sheet

Date: | Day: | Lab Tech:

pH Meter Calibration Time | Room Temp: | Meter Temp:

Standardized with pH 7 | and pH 10 | Checked with 4. | Slope

pH: Standard Methods 22nd Edition, 4500-H (2000) page 4-92

ml

	TIME	pH	TEMP	Sludge Blankets
Influent				
SBR # 1				
SBR # 2				
SBR # 3				
Digester # 1				Bags of Lime Added
Digester # 2				
Digester # 3				

TCR Collection Time: | Run Time: | Flow Rate:

	pH	TEMP	TRC (mg/l)	lbs.	Colorimeter	
Cl2					Blank	
SO2					Collected by	
e-Coli					Analysis by:	

Cl2: Standard Methods 22nd, 4500-CL G page 4-69

Cl2 collected at the end of the Cl2 chamber, SO2 is collected at the bottom of the cascade

Settleometer

SBR # 1		SBR # 2		SBR # 3	
Time (mins)	Volume	Time (mins)	Volume	Time (mins)	Volume
5		5		5	
10		10		10	
20		20		20	
30		30		30	
40		40		40	
60		60		60	
MLSS		MLSS		MLSS	
SVI	#DIV/0!	SVI	#DIV/0!	SVI	#DIV/0!

LAB TEMPERATURE LOG

Time	Cold Frig	BOD	Water Bath	Drying Oven	Dry Bath	Room	Muffle	Initials
			n/a				n/a	
			n/a				n/a	

Pumping Rates / Notes

City of Socorro, WWTP

#DIV/0!

BIOCHEMICAL OXYGEN DEMAND

SAMPLE:

Standard Methods 5210B (2001)

EQUIPMENT CALIBRATIONS

pH Meter: Date: Time On: Meter Temp:

pH: 4: pH 7: pH 10: Room Temp:

Dissolved Oxygen Meter:

Date: Time On: Meter Temp:

Room Temp: Calibration: mg/l Time Calib:

Calibrations performed by

SAMPLE

Location of sampling: In dropbox at the bottom of the cascade

Manual Composite Sampling		X	24 hr. sample
Automatic Time paced Comosite sampling (with ISCO Sampler)	X		12 hr. sample
			6 hr. sample

Sample every hours and minutes for total # of

Volume of each sample: ml Sample Bottle Iced during sampling?

Start Time: Effluent Flow @ Start:

Date of Sampling: Day of Sampling:

Sampler set up by:

Sample put in Refrigerator at: Time: Temp:

Sample out of Refrigerator : Time: Temp:

Sample Analyzed at Temp.

Removed from sampler by:

SOLUTIONS

Dilution Water: Distilled water and Nutrient Buffer added and Incubated:

Date: Time: Incubator Temp:

Sodium Sulfite Solution: 0.1575g Na_2SO_3 added to 100 ml of dH_2O

Date Prepared: Time Prepared:

Glucose - Glutamic Acid: 0.1500g Dextrose +v 0.1500g Glutamic Acid Added to 1 liter of dH_2O Prepared in oven

Date: Time In: Time Out

Placed in Desiccator: Date: Time:

G.G. Solution Prepared: Date: Time:

Solutions prepared by:

SAMPLE pH:

Initial pH:

500ml Sample neutralized with drops of 1+50H2O4/NaOH

Final pH:

CHLORINE TITRATION:

20 minute chlorination check:

Initial 100ml Sample titrated with ml of Sodium Sulfite Solution.

1000 ml Sample dechlorinated with ml of Sodium Sulfite Solution.

SET Up Date

Set Up Date: Time:

Initial DO Readings by:

IN INCUBATOR

DATE: Time:

OUT of INCUBATOR

DATE: Time:

SEED

Prepared on : Time: Polyseed: ml to capsule

Lot#: EXP: Seed used in test is hr. settled supernatant

Date Sample Collected: | Analysis by: | Avg.BOD x flow(MGD) x 8.34 = BOD lbs

Test Date: | BOD Meter Calibration / Out of Incubator

Bottle Number:											
	Blank	Blank	G.G.	G.G.	G.G.	Seed	Seed	Seed	Sample	Sample	Sample
Seed (ml)											
G.G. Solution											
Effluent Sample (ml)											
Initial D.O. (mg/l)											
Final D.O. (mg/l)											
Difference D.O. (mg/	0	0	0	0	0	0	0	0	0	0	0
Seed D.O. (mg/l)	<.20		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Corrected Difference (mg/l)			#DIV/0!	#DIV/0!	#DIV/0!				#DIV/0!	#DIV/0!	#DIV/0!

Avg. Seed	#DIV/0!
(ml) of Seed	2
Seed Ratio	#DIV/0!
(0.6 - 1.0)	

FLOW											
BOD (mg/l)			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Avg. BOD (mg/l)	#DIV/0!	Acceptable Range		Avg. Seed BOD	#DIV/0!
Avg BOD (lbs)	#DIV/0!	(167.5 to 228.5)	#DIV/0! Average		

% Eff. Of BOD Removal	
(In - Out)/ In) x 100	#DIV/0!

Duplicates / Influent / Spikes

Bottle Number:						
	Sample	Sample	Sample	Raw	Raw	Raw
Seed (ml)				3	6	9
G.G. Solution						
Effluent Sample (ml)						
Initial D.O. (mg/l)						
Final D.O. (mg/l)						
Difference D.O. (mg/l)	0	0	0	0	0	0
Seed D.O. (mg/l)	#DIV/0!	#DIV/0!	#DIV/0!			
Corrected Difference (mg/l)	#DIV/0!	#DIV/0!	#DIV/0!	0	0	0
BOD (mg/l)	#DIV/0!	#DIV/0!	#DIV/0!			
Avg. BOD (mg/l)	#DIV/0!					
Avg BOD (lbs)	#DIV/0!					

Influent	
0	
BOD	

Final DO Readings By:

Average DO Reading:	0
Amount of SEED in Samples:	0
SEED Ratio:	#DIV/0!

Duplicate BOD Results: #DIV/0!

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E-COLI Coliform Bacteria (Method 10029) (2002)

Samples are collected from the effluent flow at the bottom of the cascade

Date Effluent collected:	
Day Effluent collected:	
Time Effluent Sample collected:	
Effluent Flow @ sample grab:	
Collection Analyst:	

m-ColiBlue24

REC:	
Lot#:	
EXP:	

Date Influent Sample Collected:	
Day Influent Sample Collected:	
Time Influent Sample Collected:	

Lab Bench Cleaned with

	Feed Rate of Chlorine (lbs)		mg/l (Initial) From Bench Sheet
	Feed Rate of Sodium Dioxide (lbs)		mg/l (Final)From Bench Sheet
		0	mg/l sample bottle

CL2 Residual

Equipment Autoclave Log

Graduated cylinder and Funnel	Date:		Time:		Temp:	125
Rinse Water prepared by:	Date:		Time:		Temp:	125
Sample Bottles prepared by:	Date:		Time:		Temp:	125

CG =confluent growth

Plate #	Sample Volume	Colony Count	Organisms/100ml
I	100 ml Sterile Buffer Water	<1	
1	100		
2	100		
3	100		
R	ml Raw Influent 20	CG	
F	QA 100 ml Sterile water	<1	
	100	#DIV/0!	

TEST RESULTS #DIV/0! CFU

Date started filtering:		
Time started filtering:		
Time Ended Filtering:		
Time placed in Dry Bath:		
Dry Bath Temp:		
Analyst:		

Date removed Dry bath:		
Time removed Dry Bath:		
Dry Bath temp:		
Analyst:		

Duplicates

Plate #	Sample Volume	Colony Count	Organisms/100ml
1	100		
2	100		
	100	#DIV/0!	

TEST RESULTS #DIV/0! CFU

City of Socorro, WWTP

Final Effluent (T.S.S.)

Standard Methods 18th 2540D (1997)

Sample collected in the dropbox at the bottom of the final cascade

SAMPLE #

Collection Date:

Date removed from sampler and placed in refrigerator

Time removed from sampler and placed in refrigerator

Temperature at time of removal from sampler

Date removed from refrigerator

Time removed from refrigerator

Refrigerator temperature at time of removal

Temp of sample at time of removal from refrigerator

Sample Temperature at time of Analysis

Analyzed by

Sampler Set-Up

	Manual Composite Sampling
	24 HR. Composite Sample
	12 HR. Composite Sample
	6 HR. Composite Sample
	Time Sampler Started
	Sampler set up by
	Sample Iced during Sampling
	Was Sample Analysis after removal from sampler?

Test Results	
Average Total Suspended Solids	#DIV/0!
Average Volatile Solids	#DIV/0!
Average Volatile Solids %	#DIV/0!

Filters prefixed by:		
Date:		
Muffle Oven Temp:		For mins

Filter No.					
Location	Blank (1st)	Final Effl.	Final Effl.	Final Effl.	Blank (after)
Volume (ml)	100 DI H2O				100 DI H2O
1st Weight Filter/Sample					
2nd Weight Filter/Sample					
Filter Weight					
Muffle Oven Weight					
Total Suspended Solids	0	#DIV/0!	#DIV/0!	#DIV/0!	0
Ash Weight	0	#DIV/0!	#DIV/0!	#DIV/0!	0
Volatile Solids	0	#DIV/0!	#DIV/0!	#DIV/0!	0
Volatile Solids %	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Time in Oven		Temp:	
Time out Oven		Temp:	
Time in Oven		Temp:	
Time out Oven		Temp:	

Duplicates

Filter No.					
Location	Blank (1st)	Final Effl.	Final Effl.	Final Effl.	Blank (after)
Volume (ml)	100 DI H2O				100 DI H2O
1st Weight Filter/Sample					
2nd Weight Filter/Sample					
Filter Weight					
Total Suspended Solids	0	#DIV/0!	#DIV/0!	#DIV/0!	0

CITY OF SOCORRO

Monthly Operational Report Month 2014

Day of Week	Date	Meter Reading	FLOW (MGD)	FLOW 7-day AVG Highest per Week	PH	TCR (mg/L)	TSS (mg/L)	TSS (lbs/day)	TSS 7-day AVG (mg/L)	BOD (mg/L)	BOD (lbs/day)	BOD 7-day AVG(mg/L)	E.coli (cfu/100ml)	
Previous Reading														
Wednesday	1		0.00			0.01		0.00			0.00			1
Thursday	2		0.00			0.01		0.00			0.00			2
Friday	3		0.00			0.01		0.00			0.00			3
Saturday	4		0.00			0.01		0.00			0.00			4
Sunday	5		0.00			0.01		0.00			0.00			5
Monday	6		0.00			0.01		0.00			0.00			6
Tuesday	7		0.00			0.00		0.00			0.00			7
Wednesday	8		0.00			0.00		0.00			0.00			8
Thursday	9		0.00			0.00		0.00			0.00			9
Friday	10		0.00			0.01		0.00			0.00			10
Saturday	11		0.00			0.00		0.00			0.00			11
Sunday	12		0.00			0.01		0.00			0.00			12
Monday	13		0.00			0.00		0.00			0.00			13
Tuesday	14		0.00			0.01		0.00			0.00			14
Wednesday	15		0.00			0.01		0.00			0.00			15
Thursday	16		0.00			0.01		0.00			0.00			16
Friday	17		0.00			0.00		0.00			0.00			17
Saturday	18		0.00			0.00		0.00			0.00			18
Sunday	19		0.00			0.01		0.00			0.00			19
Monday	20		0.00			0.01		0.00			0.00			20
Tuesday	21		0.00			0.01		0.00			0.00			21
Wednesday	22		0.00			0.01		0.00			0.00			22
Thursday	23		0.00			0.01		0.00			0.00			23
Friday	24		0.00			0.01		0.00			0.00			24
Saturday	25		0.00			0.01		0.00			0.00			25
Sunday	26		0.00			0.01		0.00			0.00			26
Monday	27		0.00			0.00		0.00			0.00			27
Tuesday	28		0.00			0.00		0.00			0.00			28
Wednesday	29		0.00			0.00		0.00			0.00			
Thursday	30		0.00			0.01		0.00			0.00			
Friday	31		0.00			0.00		0.00			0.00			
			0.00					0.00			0.00			

	Flow (MGD)	Flow Highest	PH	TCR (mg/L)	TSS (mg/L)	TSS (lbs/day)	TSS 7-day AVG (mg/L)	BOD (mg/L)	BOD (lbs/day)	BOD 7-day AVG(mg/L)	E.coli (cfu/100ml)	
MAX			7.59	0.01								
MIN			7.28	0.00								
30 Day AVG		0.00			0.00	0.00		0.00	0.00		#NUM!	GeoMean
7-Day AVG MAX		0.77					High			High		7 day max e-coli
Total	0.00										#NUM!	MCFU

BOD 7 day		
BOD 30 day		0.00

TSS 7 Day		
TSS 30 Day		0.00

Notes

BOD 7 day: highest BOD reading x the flow on the day of that test x 8.34

TSS 7 Day: Highest reading x the flow on that day x 8.34

OPENCHANNELFLOW

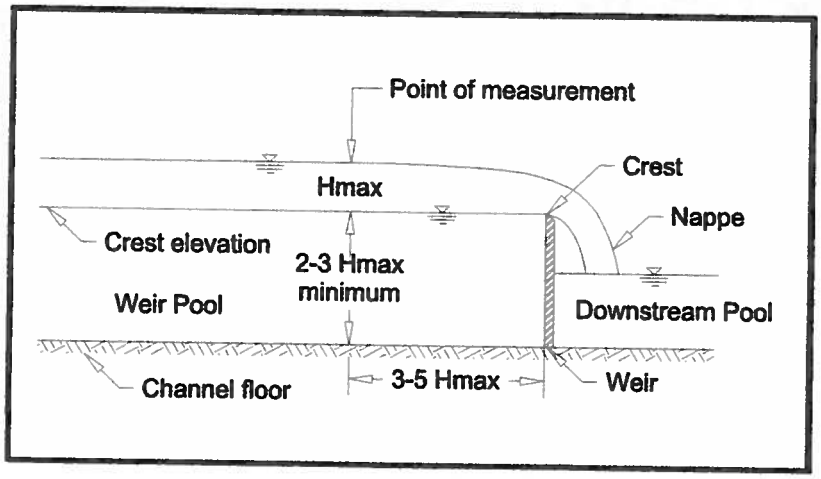
120° V-Notch Weir Discharge Table

±2-5% Accuracy

Formulas (H in feet): CFS = 4.330 $H_{ft}^{2.5}$ GPM = 1943 $H_{ft}^{2.5}$ MGD = 2.798 $H_{ft}^{2.5}$

Formulas (H in meters): L/S = 2391 $H_m^{2.5}$ M3/HR = 8606 $H_m^{2.5}$

FEET	INCHES	METERS	CFS	GPM	MGD	L/S	M3/HR
0.01	0.12	0.0030					
0.02	0.24	0.0061					
0.03	0.36	0.0091					
0.04	0.48	0.0122					
0.05	0.60	0.0152					
0.06	0.72	0.0183					
0.07	0.84	0.0213					
0.08	0.96	0.0244					
0.09	1.08	0.0274					
0.10	1.20	0.0305	Nappe may cling to downstream weir face				
0.11	1.32	0.0335					
0.12	1.44	0.0366					
0.13	1.56	0.0396					
0.14	1.68	0.0427					
0.15	1.80	0.0457					
0.16	1.92	0.0488					
0.17	2.04	0.0518					
0.18	2.16	0.0549					
0.19	2.28	0.0579					
0.20	2.40	0.0610	0.0775	34.76	0.0501	2.194	7.893
0.21	2.52	0.0640	0.0875	39.27	0.0566	2.478	8.917
0.22	2.64	0.0671	0.0983	44.12	0.0635	2.784	10.02
0.23	2.76	0.0701	0.1099	49.30	0.0710	3.111	11.19
0.24	2.88	0.0732	0.1222	54.84	0.0790	3.460	12.45
0.25	3.00	0.0762	0.1353	60.73	0.0875	3.832	13.79
0.26	3.12	0.0792	0.1493	66.98	0.0965	4.227	15.21
0.27	3.24	0.0823	0.1640	73.61	0.1060	4.645	16.71
0.28	3.36	0.0853	0.1796	80.62	0.1161	5.087	18.30
0.29	3.48	0.0884	0.1961	88.01	0.1267	5.554	19.98
0.30	3.60	0.0914	0.2134	95.80	0.1380	6.045	21.75



Sources: Skrenter, R., Instrumentation Handbook Water and Wastewater Treatment Plants

ASTM D 5242-92 (2001): Standard Test Method for Open Channel Flow Measurement of Water with Thin-Plate Weirs

OPENCHANNELFLOW

120° V-Notch Weir Discharge Table

±2-5% Accuracy

Formulas (H in feet): CFS = 4.330 $H_{ft}^{2.5}$ GPM = 1943 $H_{ft}^{2.5}$ MGD = 2.798 $H_{ft}^{2.5}$

Formulas (H in meters): L/S = 2391 $H_m^{2.5}$ M3/HR = 8606 $H_m^{2.5}$

FEET	INCHES	METERS	CFS	GPM	MGD	L/S	M3/HR
0.31	3.72	0.0945	0.2317	104.0	0.1497	6.561	23.61
0.32	3.84	0.0975	0.2508	112.6	0.1621	7.103	25.56
0.33	3.96	0.1006	0.2709	121.6	0.1751	7.671	27.60
0.34	4.08	0.1036	0.2919	131.0	0.1886	8.266	29.74
0.35	4.20	0.1067	0.3138	140.8	0.2028	8.887	31.98
0.36	4.32	0.1097	0.3367	151.1	0.2176	9.535	34.31
0.37	4.44	0.1128	0.3606	161.8	0.2330	10.21	36.74
0.38	4.56	0.1158	0.3854	173.0	0.2491	10.92	39.28
0.39	4.68	0.1189	0.4113	184.6	0.2658	11.65	41.91
0.40	4.80	0.1219	0.4382	196.6	0.2832	12.41	44.65
0.41	4.92	0.1250	0.4661	209.2	0.3012	13.20	47.49
0.42	5.04	0.1280	0.4950	222.2	0.3199	14.02	50.44
0.43	5.16	0.1311	0.5250	235.6	0.3393	14.87	53.50
0.44	5.28	0.1341	0.5561	249.6	0.3594	15.75	56.66
0.45	5.40	0.1372	0.5882	264.0	0.3801	16.66	59.94
0.46	5.52	0.1402	0.6214	278.9	0.4016	17.60	63.32
0.47	5.64	0.1433	0.6557	294.3	0.4238	18.57	66.82
0.48	5.76	0.1463	0.6912	310.2	0.4467	19.57	70.43
0.49	5.88	0.1494	0.7277	326.6	0.4703	20.61	74.16
0.50	6.00	0.1524	0.7654	343.5	0.4947	21.68	78.00
0.51	6.12	0.1554	0.8043	361.0	0.5198	22.78	81.96
0.52	6.24	0.1585	0.8443	378.9	0.5457	23.91	86.03
0.53	6.36	0.1615	0.8855	397.4	0.5723	25.08	90.23
0.54	6.48	0.1646	0.9278	416.4	0.5997	26.28	94.55
0.55	6.60	0.1676	0.9714	436.0	0.6278	27.51	98.98
0.56	6.72	0.1707	1.0162	456.0	0.6567	28.78	103.5
0.57	6.84	0.1737	1.0621	476.7	0.6865	30.08	108.2
0.58	6.96	0.1768	1.1093	497.9	0.7170	31.42	113.0
0.59	7.08	0.1798	1.1578	519.6	0.7483	32.79	118.0
0.60	7.20	0.1829	1.2074	541.9	0.7804	34.19	123.0
0.61	7.32	0.1859	1.2584	564.8	0.8133	35.64	128.2
0.62	7.44	0.1890	1.3106	588.2	0.8470	37.12	133.5
0.63	7.56	0.1920	1.3641	612.2	0.8816	38.63	139.0
0.64	7.68	0.1951	1.4189	636.8	0.9170	40.18	144.6
0.65	7.80	0.1981	1.4749	661.9	0.9532	41.77	150.3
0.66	7.92	0.2012	1.5323	687.7	0.9903	43.40	156.1
0.67	8.04	0.2042	1.5910	714.0	1.028	45.06	162.1
0.68	8.16	0.2073	1.6510	741.0	1.067	46.76	168.2
0.69	8.28	0.2103	1.7124	768.5	1.107	48.50	174.5
0.70	8.40	0.2134	1.7751	796.7	1.147	50.27	180.9
0.71	8.52	0.2164	1.8392	825.4	1.189	52.09	187.4
0.72	8.64	0.2195	1.9047	854.8	1.231	53.94	194.1
0.73	8.76	0.2225	1.9715	884.8	1.274	55.83	200.9
0.74	8.88	0.2256	2.0397	915.4	1.318	57.76	207.8
0.75	9.00	0.2286	2.1093	946.7	1.363	59.74	214.9
0.76	9.12	0.2316	2.1803	978.5	1.409	61.75	222.2
0.77	9.24	0.2347	2.2528	1011.0	1.456	63.80	229.6
0.78	9.36	0.2377	2.3266	1044.2	1.504	65.89	237.1
0.79	9.48	0.2408	2.4019	1078.0	1.552	68.02	244.8
0.80	9.60	0.2438	2.4786	1112.4	1.602	70.19	252.6

Sources: Skrenter, R., Instrumentation Handbook Water and Wastewater Treatment Plants

ASTM D 5242-92 (2001): Standard Test Method for Open Channel Flow Measurement of Water with Thin-Plate Weirs

OPENCHANNELFLOW

120° V-Notch Weir Discharge Table

±2-5% Accuracy

Formulas (H in feet): CFS = 4.330 $H_{ft}^{2.5}$ GPM = 1943 $H_{ft}^{2.5}$ MGD = 2.798 $H_{ft}^{2.5}$

Formulas (H in meters): L/S = 2391 $H_m^{2.5}$ M3/HR = 8606 $H_m^{2.5}$

FEET	INCHES	METERS	CFS	GPM	MGD	L/S	M3/HR
0.81	9.72	0.2469	2.557	1148	1.652	72.41	260.5
0.82	9.84	0.2499	2.636	1183	1.704	74.66	268.7
0.83	9.96	0.2530	2.718	1220	1.756	76.96	276.9
0.84	10.08	0.2560	2.800	1257	1.810	79.30	285.3
0.85	10.20	0.2591	2.884	1294	1.864	81.68	293.9
0.86	10.32	0.2621	2.970	1333	1.919	84.11	302.6
0.87	10.44	0.2652	3.057	1372	1.976	86.57	311.5
0.88	10.56	0.2682	3.146	1412	2.033	89.08	320.5
0.89	10.68	0.2713	3.236	1452	2.091	91.63	329.7
0.90	10.80	0.2743	3.327	1493	2.150	94.23	339.1
0.91	10.92	0.2774	3.421	1535	2.211	96.87	348.6
0.92	11.04	0.2804	3.515	1578	2.272	99.55	358.2
0.93	11.16	0.2835	3.612	1621	2.334	102.3	368.0
0.94	11.28	0.2865	3.709	1665	2.397	105.1	378.0
0.95	11.40	0.2896	3.809	1709	2.462	107.9	388.1
0.96	11.52	0.2926	3.910	1755	2.527	110.7	398.4
0.97	11.64	0.2957	4.013	1801	2.593	113.6	408.9
0.98	11.76	0.2987	4.117	1848	2.661	116.6	419.5
0.99	11.88	0.3018	4.223	1895	2.729	119.6	430.3
1.00	12.00	0.3048	4.330	1943	2.798	122.6	441.2
1.01	12.12	0.3078	4.439	1992	2.869	125.7	452.3
1.02	12.24	0.3109	4.550	2042	2.941	128.8	463.6
1.03	12.36	0.3139	4.662	2092	3.013	132.0	475.1
1.04	12.48	0.3170	4.776	2144	3.087	135.3	486.7
1.05	12.60	0.3200	4.892	2195	3.162	138.5	498.5
1.06	12.72	0.3231	5.009	2248	3.237	141.9	510.4
1.07	12.84	0.3261	5.128	2301	3.314	145.2	522.5
1.08	12.96	0.3292	5.249	2356	3.392	148.6	534.8
1.09	13.08	0.3322	5.371	2410	3.471	152.1	547.3
1.10	13.20	0.3353	5.495	2466	3.551	155.6	559.9
1.11	13.32	0.3383	5.621	2523	3.633	159.2	572.8
1.12	13.44	0.3414	5.748	2580	3.715	162.8	585.7
1.13	13.56	0.3444	5.877	2638	3.799	166.4	598.9
1.14	13.68	0.3475	6.008	2697	3.883	170.2	612.2
1.15	13.80	0.3505	6.141	2756	3.969	173.9	625.8
1.16	13.92	0.3536	6.275	2816	4.056	177.7	639.5
1.17	14.04	0.3566	6.411	2877	4.144	181.6	653.3
1.18	14.16	0.3597	6.549	2939	4.233	185.5	667.4
1.19	14.28	0.3627	6.689	3002	4.323	189.4	681.6
1.20	14.40	0.3658	6.830	3065	4.414	193.4	696.0
1.21	14.52	0.3688	6.974	3130	4.507	197.5	710.6
1.22	14.64	0.3719	7.118	3195	4.601	201.6	725.4
1.23	14.76	0.3749	7.265	3261	4.696	205.8	740.3
1.24	14.88	0.3780	7.414	3327	4.792	210.0	755.5
1.25	15.00	0.3810	7.564	3395	4.889	214.2	770.8
1.26	15.12	0.3840	7.716	3463	4.987	218.5	786.3
1.27	15.24	0.3871	7.870	3532	5.087	222.9	802.0
1.28	15.36	0.3901	8.026	3602	5.187	227.3	817.9
1.29	15.48	0.3932	8.184	3673	5.289	231.8	833.9
1.30	15.60	0.3962	8.343	3745	5.392	236.3	850.2

Sources: Skrenter, R., Instrumentation Handbook Water and Wastewater Treatment Plants

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OPENCHANNELFLOW

120° V-Notch Weir Discharge Table

±2-5% Accuracy

Formulas (H in feet): CFS = 4.330 $H_{ft}^{2.5}$ GPM = 1943 $H_{ft}^{2.5}$ MGD = 2.798 $H_{ft}^{2.5}$

Formulas (H in meters): L/S = 2391 $H_m^{2.5}$ M3/HR = 8606 $H_m^{2.5}$

FEET	INCHES	METERS	CFS	GPM	MGD	L/S	M3/HR
1.31	15.72	0.3993	8.505	3817	5.497	240.9	866.6
1.32	15.84	0.4023	8.668	3890	5.602	245.5	883.3
1.33	15.96	0.4054	8.833	3964	5.709	250.2	900.1
1.34	16.08	0.4084	9.000	4039	5.817	254.9	917.1
1.35	16.20	0.4115	9.169	4115	5.926	259.7	934.3
1.36	16.32	0.4145	9.340	4192	6.036	264.5	951.7
1.37	16.44	0.4176	9.512	4269	6.148	269.4	969.3
1.38	16.56	0.4206	9.687	4347	6.261	274.3	987.1
1.39	16.68	0.4237	9.863	4427	6.375	279.3	1005
1.40	16.80	0.4267	10.04	4507	6.490	284.4	1023
1.41	16.92	0.4298	10.22	4588	6.606	289.5	1042
1.42	17.04	0.4328	10.40	4669	6.724	294.6	1060
1.43	17.16	0.4359	10.59	4752	6.843	299.9	1079
1.44	17.28	0.4389	10.77	4836	6.964	305.1	1098
1.45	17.40	0.4420	10.96	4920	7.085	310.5	1117
1.46	17.52	0.4450	11.15	5005	7.208	315.8	1136
1.47	17.64	0.4481	11.34	5091	7.332	321.3	1156
1.48	17.76	0.4511	11.54	5178	7.457	326.8	1176
1.49	17.88	0.4542	11.73	5266	7.584	332.3	1196
1.50	18.00	0.4572	11.93	5355	7.712	337.9	1216
1.51	18.12	0.4602	12.13	5445	7.841	343.6	1236
1.52	18.24	0.4633	12.33	5535	7.971	349.3	1257
1.53	18.36	0.4663	12.54	5627	8.103	355.1	1278
1.54	18.48	0.4694	12.74	5719	8.236	360.9	1299
1.55	18.60	0.4724	12.95	5813	8.370	366.8	1320
1.56	18.72	0.4755	13.16	5907	8.506	372.7	1341
1.57	18.84	0.4785	13.37	6002	8.643	378.7	1363
1.58	18.96	0.4816	13.59	6098	8.781	384.8	1385
1.59	19.08	0.4846	13.80	6195	8.921	390.9	1407
1.60	19.20	0.4877	14.02	6293	9.062	397.1	1429
1.61	19.32	0.4907	14.24	6392	9.204	403.3	1451
1.62	19.44	0.4938	14.46	6491	9.348	409.6	1474
1.63	19.56	0.4968	14.69	6592	9.493	416.0	1497
1.64	19.68	0.4999	14.91	6693	9.639	422.4	1520
1.65	19.80	0.5029	15.14	6796	9.787	428.8	1543
1.66	19.92	0.5060	15.37	6899	9.936	435.4	1567
1.67	20.04	0.5090	15.61	7004	10.09	441.9	1590
1.68	20.16	0.5121	15.84	7109	10.24	448.6	1614
1.69	20.28	0.5151	16.08	7215	10.39	455.3	1638
1.70	20.40	0.5182	16.32	7323	10.54	462.1	1663
1.71	20.52	0.5212	16.56	7431	10.70	468.9	1687
1.72	20.64	0.5243	16.80	7540	10.86	475.8	1712
1.73	20.76	0.5273	17.05	7650	11.02	482.7	1737
1.74	20.88	0.5304	17.29	7761	11.18	489.7	1762
1.75	21.00	0.5334	17.54	7873	11.34	496.8	1788
1.76	21.12	0.5364	17.79	7986	11.50	503.9	1813
1.77	21.24	0.5395	18.05	8100	11.66	511.1	1839
1.78	21.36	0.5425	18.30	8215	11.83	518.4	1865
1.79	21.48	0.5456	18.56	8331	12.00	525.7	1891
1.80	21.60	0.5486	18.82	8447	12.16	533.0	1918

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Formulas (H in meters): $L/S = 2391\ H_{m}^{2.5}$ $M3/HR = 8606\ H_{m}^{2.5}$

FEET	INCHES	METERS	CFS	GPM	MGD	L/S	M3/HR
1.81	21.72	0.5517	19.08	8565	12.334	540.5	1945
1.82	21.84	0.5547	19.35	8684	12.505	548.0	1972
1.83	21.96	0.5578	19.62	8804	12.678	555.5	1999
1.84	22.08	0.5608	19.89	8925	12.852	563.2	2026
1.85	22.20	0.5639	20.16	9046	13.027	570.8	2054
1.86	22.32	0.5669	20.43	9169	13.204	578.6	2082
1.87	22.44	0.5700	20.71	9293	13.382	586.4	2110
1.88	22.56	0.5730	20.98	9417	13.562	594.3	2138
1.89	22.68	0.5761	21.26	9543	13.743	602.2	2167
1.90	22.80	0.5791	21.55	9670	13.925	610.2	2196
1.91	22.92	0.5822	21.83	9798	14.109	618.3	2225
1.92	23.04	0.5852	22.12	9926	14.295	626.4	2254
1.93	23.16	0.5883	22.41	10056	14.482	634.6	2283
1.94	23.28	0.5913	22.70	10187	14.670	642.8	2313
1.95	23.40	0.5944	22.99	10319	14.860	651.1	2343
1.96	23.52	0.5974	23.29	10452	15.051	659.5	2373
1.97	23.64	0.6005	23.59	10585	15.244	668.0	2403
1.98	23.76	0.6035	23.89	10720	15.438	676.5	2434
1.99	23.88	0.6066	24.19	10856	15.633	685.0	2465
2.00	24.00	0.6096	24.49	10993	15.831	693.7	2496

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